

Digital Geriatric Medical Care in the Era of Big Data: A Narrative Review and Case Study of a Chinese Aged Care Facility

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Objective: This study aims to explore the development prospects and trends of digital geriatric medical care in the era of big data. By taking the Longhu Ecological Senior Apartment in Bengbu City as a case example, the study examines the integration of intelligent healthcare systems for elderly populations and proposes solutions to bridge the digital divide, ensuring accessible healthcare for seniors in the context of rapid technological advancements.

Methods: This study employed a mixed-methods approach, combining a review of national policies and global practices with an in-depth case study at the Longhu Ecological Senior Apartment in Bengbu City. Quantitative data on residents' demographics, health status, and technology adoption were collected from institutional records. Qualitative insights were obtained through semi-structured interviews with administrative staff and caregivers. Data were analyzed using descriptive statistics and thematic analysis.

Results: More than 95% of the residents suffered from chronic illnesses, and 73.30% were aged 80 years or above. Despite the availability of smart medical devices, 48.80% of residents reported difficulty in using digital tools due to insufficient technological literacy, and 46.30% were unaware of product functions. Economic burden and safety concerns further hindered acceptance. The gap between the rapid growth of digital health services and seniors' limited ability to engage created a pronounced digital divide.

Conclusion: To cope with the growing elderly population, digital healthcare must be further developed and tailored to meet the specific needs of the elderly. Bridging the digital divide through user-friendly technologies and policy support is crucial. The integration of 5G, telemedicine, and virtual reality holds great potential for improving elderly healthcare services, but a coordinated effort from the government, healthcare providers, and technology developers is necessary for sustainable and effective implementation.

Keywords: digital health, geriatrics, big data, development analysis

Introduction

Population aging has become a widely recognized global challenge, posing increasing pressure on healthcare systems, long-term care services, and the management of chronic diseases.¹ As life expectancy continues to rise and fertility rates decline, the proportion of older adults is growing rapidly worldwide.

In response, digital healthcare, including telemedicine, mobile health applications, artificial intelligence assisted services, and remote health monitoring, has been increasingly promoted as a key strategy to improve the accessibility, efficiency, and continuity of elderly care.² Digital medical technologies have been progressively integrated into geriatric healthcare and elderly care institutions, offering new possibilities for medical consultation, health management, and service coordination. However, the rapid expansion of digital healthcare has also exposed persistent inequalities in access and use among older adults, raising concerns about digital exclusion and unequal participation.³

Against this background, this study examines how digital healthcare is implemented and experienced in elderly care settings, and explores the structural, institutional, and individual factors shaping the digital divide in geriatric healthcare through a narrative review and a qualitative case study. At the same time, it advances an analytical framework that connects digital service accessibility, digital literacy, and institutional support mechanisms, thereby offering a more comprehensive explanation of how the digital divide affects older adults' healthcare participation.

China's Current Demographic Situation – the Background of an Aging Society

According to the results of the seventh national census in 2020, China's population has exceeded 1.4 billion, making it the most populous country in the world. According to the United Nations aging standards, if a country's population aged 60 or older exceeds 10% of the total population, or if the population aged 65 or older exceeds 7% of the total population, it means that the country has entered an aging society. According to the 7th Population Census, China's population aged 60 and above is 264,019,000, accounting for 18.70% of the total population, of which 190,635,000 are aged 65 and above, accounting for 13.50%.⁴ The data show that China is already in the stage of population aging, compared with the previous census data show that in recent years, China's elderly population is still increasing, the degree of aging is deepening, and it is expected that by the middle of this century, the size of China's elderly population and the aging rate will reach the peak one after another (Figure 1). Compared with other major aging societies, China faces a unique dual pressure of rapid aging and uneven digital transformation. This combination makes China an important and representative case for examining the challenges and opportunities associated with digital healthcare for seniors in developing and transitional digital environments. The process of population aging brings China another formidable risk challenge in the 21st century of rapid economic development. Population aging has had a certain adverse impact on labor supply, scientific and technological innovation development, and social life security. As the proportion of the elderly population rises, the direct result is a significant reduction in the number of people in the labor force and a steep decline in labor productivity; while the aging of the population is not only a decline in physiological functions and slowness of movement, but also a decline in creativity, memory, and other aspects of the brain, which is clearly a gap with the

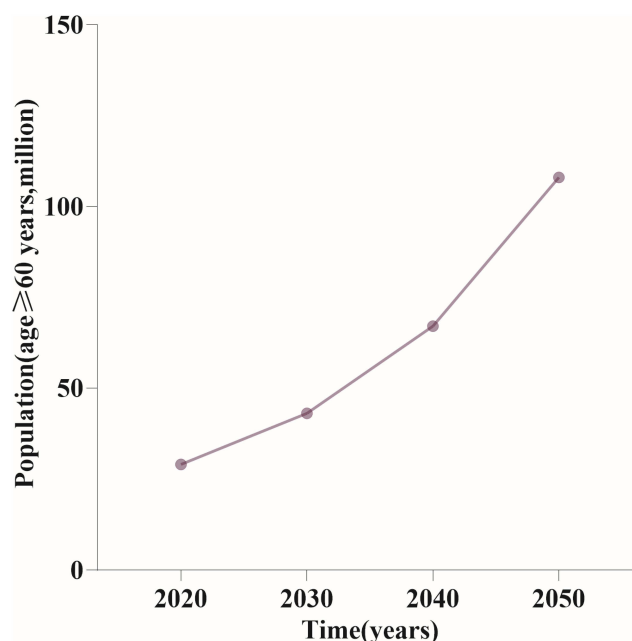


Figure 1 Forecast of the number of elderly people over 60 years of age in China. It shows the projected growth of the elderly population in China aged 60 and above from 2020 to 2050. The data indicates that in 2020, this population was 0.29 billion, and it is expected to increase to 0.43 billion by 2030, 0.67 billion by 2040, and reach 1.08 billion by 2050. This significant growth trend highlights the challenges China will face due to population aging and the anticipated increase in demand for elderly healthcare services in the coming decades.

turnover of social innovation and progress. However, China is also actively responding to and solving the challenges of the aging population status quo, such as the three-child policy, which was liberalized on May 31, 2021,⁵ an optimal fertility policy to accelerate the realization of the youth population growth. Promoting population growth is one aspect, but the importance and necessity of improving the existing pension system for the elderly, upgrading the level of pension services, and synergizing the development of the aging cause with scientific and technological innovations are becoming more and more obvious and urgent.

As age increases, such as cardiovascular disease, the incidence of chronic diseases in the elderly population occupies a considerable proportion of the elderly sick compared to young people for the medical treatment of most of the main body, due to the elderly various cellular organs and tissues of the structure and function of the age of the growth of the age of the year, and thus the adaptability of the reduced resistance, the incidence of morbidity increased.⁶ Therefore, the prevention and treatment of geriatric diseases is one of the most important measures of health care for the elderly. However, in the 21st century, with the rapid development of science and technology innovation, coupled with the large number of sick people and the relative lack of human resources in the medical industry, it is difficult for the elderly to see the doctor and seek medical treatment, which is more reflected in the inability to instantly match with the intelligent network information.⁷ In the gradually intelligentized medical system, the elderly seem to have encountered a great “problem” - they do not know how to make an appointment online, lack of cell phone operation skills, and do not understand the instructions of the medical process. This has made them overwhelmed by the big data, on top of their existing illnesses, and has increased their fear of and resistance to seeking medical treatment.⁸

In the National Plan for the Development of the Elderly and the Elderly Service System for the Fourteenth Five-Year Plan, it is pointed out that vigorous efforts will be made to develop the silver-hair economy, promote the technological and intelligent upgrading of geriatric products, build an intelligent society that takes into account the needs of the elderly, and find a long-term solution to the problem of the “digital divide”. Promote intelligent services to meet the needs of the elderly. The digital divide in geriatric healthcare describes the mismatch between the rapid expansion of digital medical services and the limited capacity of many older adults to access and use them, resulting in uneven healthcare accessibility.⁹ Therefore, in the context of artificial intelligence and 5G era, how to accurately locate digital healthcare to the elderly population and provide reliable support for their health protection is a major hotspot of social research.¹⁰

Concepts Related to Digital Health

Digital healthcare is a comprehensive and emerging form of healthcare service integrating self-help healthcare,¹¹ telemedicine and convenient healthcare, which is formed by the continuous cross-fertilization of traditional medical practice with information technology and digital technology. Including telemedicine platforms, mobile health applications, online hospital appointment systems, wearable health monitoring devices, and AI-assisted medical services—to support disease prevention, treatment, and long-term health management. The essence of digital healthcare is to utilize digital science to explore the causes of diseases, explain medical phenomena, improve medical technology, and seek deeper development for human health protection. Existing studies on digital health mainly fall into three streams: research on digital healthcare technology and service delivery models; studies on user behavior and digital engagement outcomes; and emerging discussions on structural inequalities in digital access.

Digital Healthcare Development Abroad

According to the EC (European Commission, EC) data in recent years, as of 2020, the elderly over 65 years of age in the EU (European Union, EU) has accounted for 25% of the total population, which means that the aging of the population in Europe is becoming more and more significant, members of the European Union countries are facing a shortage of medical resources, the number of people seeking medical treatment has increased dramatically, and the healthcare system is in urgent need of further improvement and a series of problems, the EU believes that vigorously develop the digital healthcare market is a feasible and effective measure to solve the healthcare challenges of the information age. The EU believes that vigorously developing the digital healthcare market is one of the feasible and effective measures to address healthcare challenges in the information age. The European Commission has been promoting the development of digital healthcare since the 1990s.¹² In 2004, the European Commission issued the “Digital Healthcare Action Plan”, which

requires member states to draw up their own digital healthcare development strategy, establish professional functional organizations and basic teams, strengthen innovation and investment in digital healthcare technology, and carry out on-site practice. The EU's R&D (Research and Development, R&D) on digital healthcare technology focuses on key areas such as portable and remote personal healthcare management systems, hospital-patient safe healthcare information guidance services, and virtual physiological person programs. The Digital Healthcare Action Plan identifies digital healthcare application areas, such as patient summaries and electronic healthcare records, e-prescriptions, telemedicine services, aiming at establishing information and healthcare services in the field of digital healthcare. Medical Services, aiming at establishing an emerging medical model in the information age, providing high-quality, fast and accurate healthcare services for healthcare workers and patients, improving and perfecting the medical service system, and enhancing the accessibility of medical services. International digital healthcare development varies substantially across regions.¹³ While the European Union has formulated a mature digital health governance framework, countries such as Japan, Singapore, and the United States have also built comprehensive remote medical and digital care service systems. These examples not only provide benchmarking value but also offer practical implications for improving geriatric digital healthcare in China.

Domestic Digital Healthcare Development

China's "Fourteenth Five-Year Plan" also emphasizes the promotion of technological and intelligent upgrading of geriatric products, and accelerates the in-depth application of information technology and intelligent products such as the Internet and artificial intelligence in the field of geriatrics. With the corresponding national policy call and actively respond to the necessity of the development of aging society, China's digital health care in recent years has gradually formed a horizontal, vertical, multi-industry joint vertical information management model. Based on the traditional medical model, the development of hospital information systems gradually to the depth of the integration of intelligence, to achieve "profit-centered" to "health-centered" transformation of digital hospitals. According to government data, at this stage, more than 90% of China's tertiary care hospitals have opened information technology systems and diagnosis and treatment channels, and digital medical technology is mainly reflected in the establishment of a health cloud data platform center, the creation of digital healthcare associated diagnosis and treatment service platform, specialized telemedicine and individualized self-help medical care. In addition to the hospital units need to innovate the operation system to match the high degree of information medical construction, the government medical and health care management departments also need to improve the medical supervision mechanism, unified planning and construction, and increase the capital investment. Digital self-help medical care can be reflected in the patient in the hospital from the traditional "one person, one card" to the Internet online diagnosis and treatment "one card"¹⁴ services, to facilitate the doctor's grasp of the patient's overall medical history, treatment; telemedicine to the 5G era¹⁵ network data transmission for the Foothold, relying on communication technology to develop intelligent medical, so as to realize the real-time monitoring and collection of human health data, the initial intention of its research and development is also to optimize the distribution of regional imbalance and insufficient medical resources, so that those remote areas of poor medical resources can also have the quality of diagnosis and treatment and professionalism is guaranteed by the level of health care services;¹⁶ digital virtual reality medical technology is also in the treatment of disease, rehabilitation and other areas have been fully explored and used to some extent. Full exploration and a certain degree of use, the use of its intuitive interaction, visualization design advantages through the procedural process to encourage users to play their own subjective initiative to enhance the patient's medical experience, but also with the development of telemedicine, to open up a new situation of digital health care.

Digital Health and the Elderly Population

During the "14th Five-Year Plan Period", China has started a new journey to build a socialist modernized country in an all-round way, and in order to actively cope with the problem of population aging, the Chinese government attaches great importance to the construction of the aging cause and the soundness of the old-age service system, and further improves the basic medical insurance system for the elderly. Due to the age disadvantage and the decline of physical function, the silver-haired people (refers to the people between black hair and gray hair, ie, the elderly) have become the

“disadvantaged group” in the digital healthcare, according to the 50th “China Internet Development Statistical Report” released shows that: China’s non-internet users are 362 million, of which the elderly aged 60 years and above accounted for 41.60%, and the non-internet users accounted for 41.60%. Groups accounted for 41.60%, non-internet users do not go online because they do not understand the computer/network, age factors, cultural limitations and other factors, resulting in the majority of silver-haired people out of the network society, in the process of daily medical treatment encountered a lot of inconvenience.¹⁷ Socioeconomic status, education, and regional differences greatly influence older adults’ use of digital healthcare. Those with lower income or limited digital literacy are less likely to own smart devices or confidently operate telehealth platforms, which restricts their access to online medical services. In addition, uneven digital infrastructure across regions, especially between urban and rural areas, further widens the digital health gap among the elderly.¹⁸ At the same time. Silver-haired people are placed in the context of artificial intelligence, coupled with their unfamiliarity with the network world, unfamiliar feeling, the multiple blows of negative psychological factors, which is even more sap the enthusiasm of their use of intelligent operation,¹⁹ and over time the silver-haired people heart surplus, seriously consumed their patience to learn network skills.

APP Adaptation Retrofit

The first step in assisting the elderly in the era of big data is the transformation of APP (Application, APP) for aging. The main purpose of digital medical design is to facilitate the people, compared with the traditional medical system, which adheres to the principle of faster efficiency, more accurate diagnosis, shorter time to maximize the realization of the fastest and best cure for the disease. But for the elderly, the difficulty is that they do not know how to open the door to the use of intelligent electronic products, therefore, in response to the call for long-term development of the policy to mobilize the silver-haired people to take the initiative to learn the enthusiasm. At the beginning of the new crown epidemic, show the health code, trip code, open the nucleic acid test report these seemingly young groups in the simple operation but in the silver-haired people in the use of network skills, it is worthwhile to think about is that now the information technology seems to be in the cast of young people’s preferences and interests, but in a fast-developing society, social resources, welfare should be built and shared. Therefore, in the consideration of the young subject at the same time, we also need to heart for the silver-haired people to open up intelligent medical channels, personal field for them to plan a convenient medical system.²⁰ 2020, the State Council General Office of the issuance of the “on the practical solution to the implementation of the program for the elderly use of intelligent technology difficulties notice”, clearly proposed to promote the Internet application of aging transformation. For example, Jitterbug’s “Elder Mode” is to provide convenience for the silver-haired people, its text enlargement, program optimization, more concise design, see more clearly; more WeChat’s “Caring Mode”,²¹ the developer to further examine and fit the actual situation of the elderly, but also on the line! The developer further examined and adapted to the actual situation of the elderly, and also launched the function of “listening to text messages” to maximize the experience and comfort of the silver-haired people when they use the APP; the railroad 12306 aging-friendly function on the line, simplified the ticket interface, larger font, and added a key to the ticket function, which makes it more convenient for the elderly to travel. Based on the development model of the ageing-friendly APP, the government, enterprises and hospitals can also launch a “caring version” of the medical service platform. According to relevant media reports, in order to make it smoother for the elderly to register by cell phone, Zhejiang Province has carried out age-appropriate digital transformation of the appointment and treatment service platform, and released a “caring version”. All residents aged 60 and above, open the “Zheli Office” App, enter the appointment registration interface, will pop up “care version” interface recommendation. Compared with the interface of “ordinary version”, the most intuitive change of “caring version” is that fonts and buttons are enlarged, and the functions are more concise. Moreover, if the operation is still difficult, the elderly can directly select “telephone reservation” on the interface, and register manually by phone; or use the “voice assistant”, say the hospital, department and other information, and the system will automatically match into the relevant page.²² For example, the software store market launched a “community good doctor” APP, in order to solve the low utilization rate of medical resources in the community, small illnesses, large number of doctors, the elderly to see the doctor inconvenience, etc., based on the current stage of the intelligent community in the technology may be realized, around the APP around the community hospitals of the various stakeholders in the connection, to help the general practitioner Doctors can

instantly grasp the long-term physical quality of residents in the community, especially the elderly, and provide a more reliable basis for early detection, early diagnosis, and early treatment of diseases. As policies continue to open up, and with the trend towards digitalization of society, the concept that older people value learning how to operate on the internet will gradually become more advanced, optimizing the experience of online medical care for the silver-haired, making the “Internet+Medicine”²³ more inclusive and operational, and stimulating the silver-haired’s motivation to seek medical care on the internet.

Linked and Shared Intelligent Information Service Platforms

The second step to help the elderly to get medical treatment - Linked and shared intelligent information service platform.²⁴ Based on the medical needs of common diseases in the elderly, it creates digitalized elderly medical precision services, so that the elderly can have a sense of security and healing. The elderly due to the continuous decline in physical function, the function of various organs and tissues aging, immune function is constantly low, the incidence of chronic diseases, cardiovascular, tumors and other diseases compared to younger groups greatly increased, compared to hospitals in the past diagnosis and treatment of disease focus on the work carried out to prevent the occurrence of disease development is more people are gradually aware of the importance of the implementation of its relevant policies. Just as the Yellow Emperor’s Classic of Internal Medicine puts forward “the upper doctor treats the disease before it occurs, and the Chinese doctor treats the disease of desire”, with the development of the information age, in view of the deepening of the degree of aging society, can we reasonably make use of the high-tech intelligent instruments to carry out the targeted screening on the body of the elderly as early as possible to find out some kind of latent pathology, and adopt the way of comparison between the Chinese and Western medicines for a comprehensive analysis and the development of the intervention and conditioning program in a scientific and rationalized way? Rationalization of the development of intervention and conditioning programs, in order to nip this latent pathology in the bud, and strive for the maximization of health and optimization of the quality of life is the ultimate goal of the “Internet + geriatrics”.

With the gradual deepening of aging, the elderly mobility, slow reaction, for the elderly suffering from diseases, their own energy is more limited, go to the hospital to see a disease often costly, wait until the review again, which is often delayed for a long time; not to mention anytime and anywhere to monitor the disease situation to do the first time to the doctor’s feedback, so we should vigorously promote the construction of the construction of family digital health care system, so that the silver-haired people can enjoy real-time diagnosis and treatment of diseases without leaving home, to overcome the problems brought about by distance and lack of time. Therefore, we should vigorously promote the construction of a home digital medical service system, so that the silver-haired people can enjoy real-time diagnosis and treatment of diseases without leaving their homes, and overcome the problems caused by distance and lack of time, so that the elderly patients will no longer be “troublesome” to seek medical treatment and shirk medical treatment. For example, in order to strengthen the monitoring of chronic diseases in the elderly, the core of disease management is real-time monitoring of diseases, the existing intelligent health detector²⁵ can accurately collect the data of various biochemical indicators of the human body, and re-analyze and organize the data to provide a dynamic record of changes in the disease data, and share this record in the form of a document to the doctor, and video phone calls with the doctor, to realize the remote consultation, online consultation. Consultation. The emergence of this intelligent instrument is especially friendly to the elderly, greatly simplifying the cumbersome procedures of their medical consultation, so that the patient’s early recovery on a new agenda. Furthermore, in some major cities, tertiary hospitals are partnering with local communities to launch online medical consultation platforms. The hospital will regularly organize expert doctors to hold online health education lectures. These sessions are designed to address the diagnostic and treatment concerns of elderly patients. They also serve to disseminate scientific knowledge on disease prevention and promote healthy lifestyles. In recent years, the “Internet Hospitals”²⁶ are also active in people’s vision. Through these platforms, hospitals can organize free online clinics for the elderly. Volunteers are recruited to help seniors navigate the digital interface, while doctors provide remote consultations, making healthcare more convenient.²⁷ Under the strong support of the state, the primary healthcare system is also gradually developing and growing, through the implementation of community general practitioner family contracting services, the creation of a related and shared intelligent information service platform, and the establishment of a two-way referral mechanism between specialist hospitals and community health

service centers,²⁸ realizing immediate and effective communication between general practitioners and specialists, and providing feasible and guaranteed articulation of healthcare services for elderly patients. If you want to make digital geriatric services efficiently used for the elderly, the relevant enterprises still need to conduct in-depth research on intelligent medical treatment, continuously improve the application level of artificial intelligence technology, expand the scope of ageing-appropriate digital medical services, and accelerate the construction of intelligent elderly assistance service team building.

Virtual Reality Helps Digital Geriatric Care Take a Leap Forward

The third step in helping the elderly to seek medical treatment - virtual reality helps digitalized geriatric medical care to take a leap forward. In recent years, as the 21st century emerging virtual reality technology,²⁹ has been in the culture and education, science and technology enterprises, industrial development and other fields of practical use quite effective, its development in the field of medical rehabilitation is also achieved many excellent results, has been greatly affirmed by the industry. For example, virtual reality technology through the implementation of virtual simulation surgery, remote control,³⁰ positioning organs and tissues fine operation, no number of cycle limitations, surgeons can repeatedly practice and practice, to create a new type of clinical teaching mode, not only for interns to supply more operating opportunities, but also efficiently improve the professional level of the Linfield doctors, for the patient's rehabilitation treatment of the heavily reinforced, to better protect the interests of patients. As for digital geriatrics, virtual reality technology is of great potential significance. Virtual reality technology can be realized so that the elderly do not leave home can also appreciate the wonderful world outside, to do home can also exercise, strengthen the effect of sports. With the aging of the population, osteoporosis and bone calcium salt loss in the elderly have significantly increased the risk of falling, if virtual reality technology can be widely used in the community, grassroots osteoporosis in the elderly anti-fall prevention, through the simulation of virtual outdoor environments, running, bicycling, Badaogu Jin³¹ functional training and other sports to enhance the physical fitness of the elderly, and to enhance the ability of the trunk to control the balance, and thus consolidate gait, posture, and other physical activities. This can greatly reduce the incidence of fall risk among the elderly to a certain extent, and enhance the sense of well-being and safety in their later years. Compared with young people, the disease rate of the elderly is greatly increased, both psychological and physical function level is in a gradually weakened state, in the clinician's actual diagnosis and treatment, virtual reality technology can effectively assist in optimizing the rehabilitation and prognosis, design interesting virtual rehabilitation environment, let the patient immersed in experiencing a better life, temporarily away from the disease, distracting the elderly and reducing the sense of pain. The For the hospice-related background and characteristics of geriatric medical care, we vigorously promote the high-tech exploration and popularization application of virtual reality technology to improve the health service guarantee for the elderly under big data, and realize that the technology is really used for the old. Nowadays, virtual reality has gradually penetrated into people's lives, and I believe that its future development in geriatric medical care is obvious to all, and it will use the Internet platform to push the level of professionalism and treatment efficiency in the medical field to the accessible peak.

Analysis of the Current Situation of Senior Citizens' Residences

Through discussions with the staff of The Longhu Ecological Elderly Residence and a comprehensive field investigation, we were able to gather the following information regarding the facility and its operations. The Longhu Ecological Elderly Residence in Bengbu City, Anhui Province, currently has 120 elderly people living in the facility, with 88 elderly people over the age of 80, accounting for 73.30% of the total; more than 95% of the elderly people suffer from hypertension, diabetes, and other chronic underlying diseases; their education level is mostly at the elementary school level or below (Figure 2); and the average length of time they have been in the institution has been between one and two years (Figure 3). This study selected this apartment due to its representative demographic structure of the aging population in a non-metropolitan Chinese city and the clear manifestation of the digital divide within its operations. All the respondents agreed to participate in this study and signed the written informed consent form. Interviews among 26 participants comprising 14 elderly residents, 8 caregivers, and 4 institutional managers revealed a prevailing perception among many individuals around the age of 75: they believe they remain mobile, are in good health, and are capable of sharing

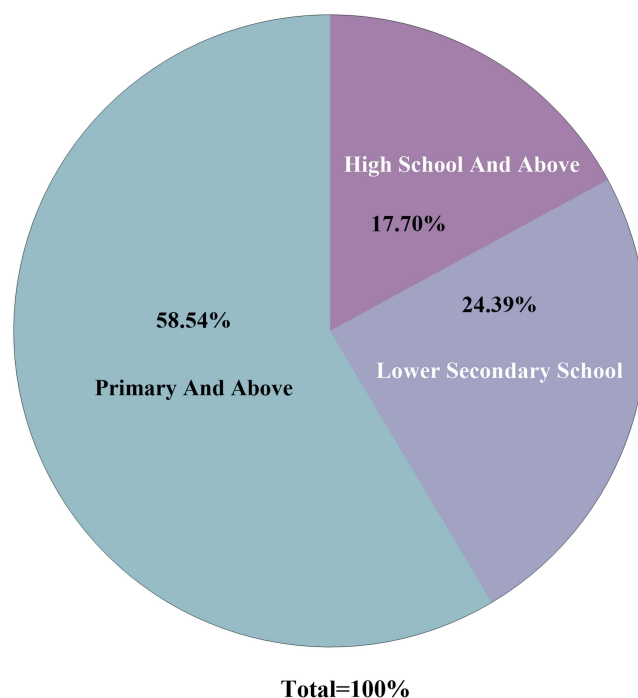


Figure 2 Educational Level of the Elderly in Bengbu Longhu Ecological Elderly Residence. It illustrates the distribution of the educational levels among the elderly residents in Bengbu Longhu Ecological Elderly Residence. The majority of the elderly, 58.54%, have a primary school education or above. Approximately 24.39% completed lower secondary school, while 17.07% attained a high school education or higher. This data highlights the relatively low overall educational level among the elderly residents, which may influence their adaptability to modern digital healthcare technologies.

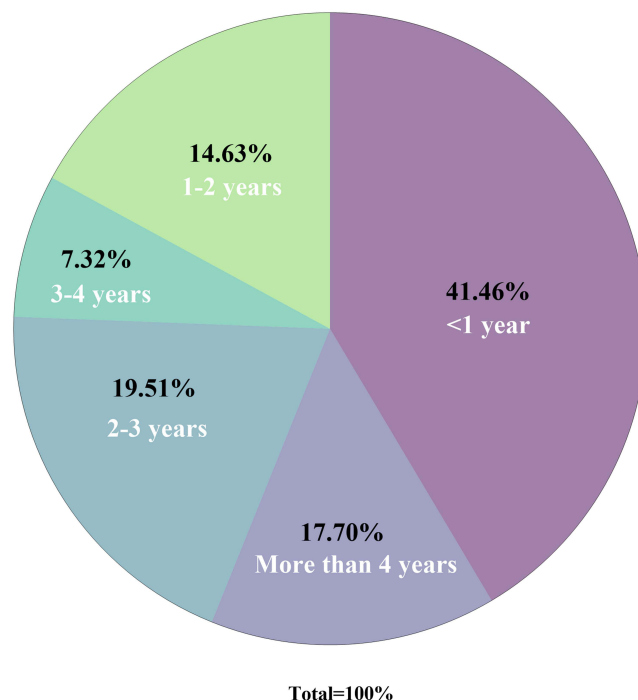


Figure 3 Duration of stay in the apartment. It shows the distribution of the duration of stay of elderly residents at the Longhu Ecological Elderly Apartment. The largest group, 41.46%, has stayed for less than 1 year. Residents who have stayed for 2–3 years make up 19.51%, while those with 1–2 years of residence account for 14.63%. A smaller proportion of residents have stayed for 3–4 years (7.32%) and more than 4 years (17.07%). This indicates that a significant portion of the residents are relatively new to the facility, with shorter stays being more common.

household chores, thus seeing no need to move into a nursing home. Once wait until eighty or ninety years old or disease, family members can not provide comprehensive care, their children will choose to send them into the elderly housing, with the increase in age, the old man's sense of loneliness, uneasiness is also gradually revealed, the mental health of the situation is easy to be ignored is also quite worried. From a broader perspective, the majority of the elderly are still relatively resistant to entering institutions due to the influence of traditional attitudes.

At this stage, senior living organizations are also actively corresponding to the national policy, introducing intelligent senior living equipment and vigorously carrying out intelligent senior living services. Elderly apartments are now set up with smart rooms and smart robots to assist the elderly to better voice their needs and facilitate timely contact with staff for help. However, the digital aging resources are still seriously lacking, with the institution's own strength can not yet allow all the elderly to enjoy the benefits of smart aging, given the purchase of a smart aging equipment is expensive, and the use of technology requirements are high, the apartments are burdened with the risk of greater economic pressure, the use of the elderly is not optimistic, aging makes the elderly various physiological functions decline, adaptability declines. The new equipment is not very maneuverable (Figure 4). For the staff of the organization, most of the apartment caregivers come from rural areas, with relatively low cultural level, and there is still a certain degree of difficulty in the use of intelligent equipment products, which cannot make the intelligent elderly equipment play the greatest degree of efficacy for the elderly service.

The government has been strongly supporting the development of intelligent elderly care,³² and the social aspect, medical, intelligent elderly care manufacturers can provide more to the elderly apartments to try new products, the introduction of new equipment, after a certain number of elderly application, the apartment can be the use of the product and the elderly to adapt to the situation of the corresponding feedback to the businessmen, which in turn improves the development of intelligent elderly care of the audience, but also to promote the development of multi-party mutual assistance; technical staff, the government Encourage regions to explore innovative and diversified geriatric medical care service models, increase the number of medical institutions and beds providing geriatric medical care services, and strengthen the cultivation and training of geriatric medical care practitioners,³³ to improve the professionalism and working ability of institutional staff and caregivers.

According to the demographic data of Bengbu City, as of the end of 2022, the resident elderly population of Bengbu City over 60 years old will be about 635,000, accounting for about 19.19% of the city's total population, and the aging rate of the population has reached the national average level. The overall rate of population aging has reached the national average. The overall rate of increase is fast, the age is high, and the population base is large. Under the "silver digital divide", the acceptance of the elderly for smart elderly services is still low, and there is resistance to the promotion of smart elderly services (Figure 5). At present, the vast majority of the elderly can only use some simple traditional electronic devices, and with the gradual decline of their own cognitive ability, it is even more difficult for the elderly to

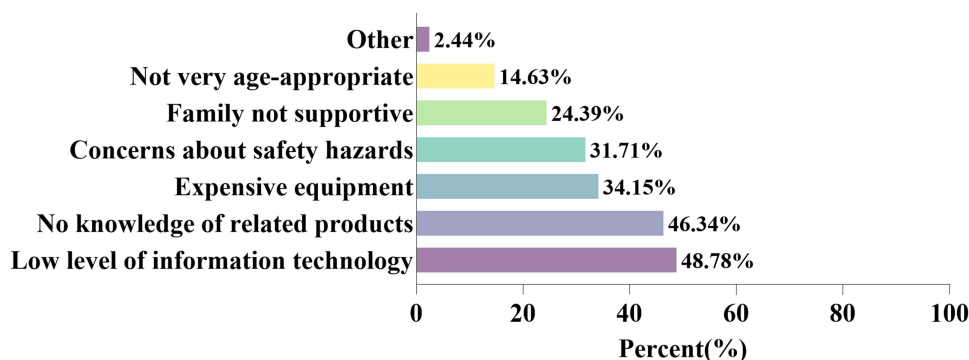


Figure 4 Reasons for the elderly not using the "Smart Elderly" equipment. It presents the various reasons why elderly residents at the Longhu Ecological Elderly Apartment are reluctant to use smart elderly equipment. The most common reason is the low level of information technology proficiency (48.78%), followed by a lack of knowledge about related products (46.34%) and the high cost of the equipment (34.15%). Safety concerns are also significant, with 31.71% of residents citing this as a reason. Additionally, 24.39% of residents mentioned that their families are not supportive, while 14.63% feel that the equipment is not very age-appropriate. A small percentage (2.44%) listed other reasons.

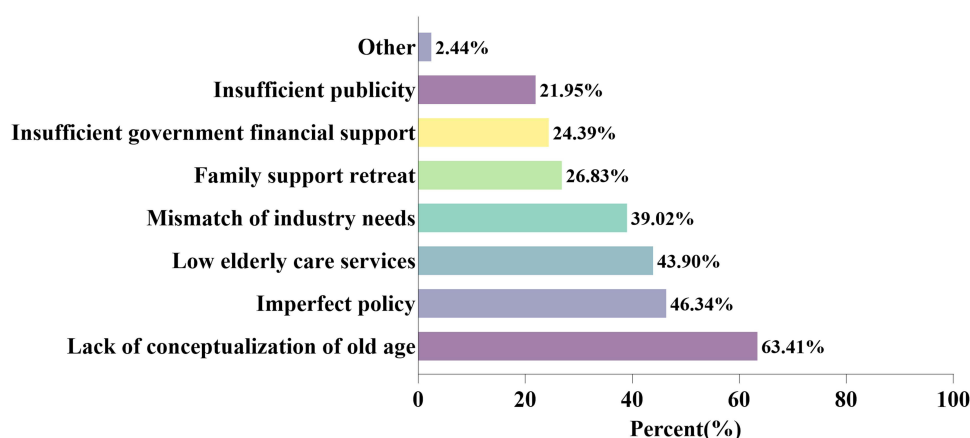


Figure 5 Reasons why elderly people in apartments think that the model of old age is insufficient. It outlines the reasons why elderly residents in the Longhu Ecological Elderly Apartment believe that the current elderly care model is inadequate. The most prominent reason, cited by 63.41% of respondents, is the retreat of family support. Other significant factors include insufficient elderly care services (46.34%), a lack of conceptualization of old age (43.90%), and mismatches with industry needs (39.02%). Additional reasons include imperfect policies (24.39%), insufficient government financial support (21.95%), and a lack of publicity about elderly care services (28.83%). A small percentage (2.44%) listed other reasons.

use digital smart products, hindering the popularization of smart elderly services.³⁴ Therefore, digital healthcare for the elderly requires the support of the government, hospitals, communities and families to build a win-win model of healthcare integration.³⁵ For example, the impact of VR technology on the fall resistance of osteoporotic elderly in community-based elderly care facilities can improve the balance of osteoporotic elderly, and the expected effect of reducing the incidence of falls among the elderly is just around the corner. If the government issued a policy of encouragement to call for VR companies to set up joint ventures with them³⁶ to maximize the benefits of giving wisdom to the elderly at the same time to win the economic benefits, the community and the family try to buy wisdom to the elderly products, so that the elderly to experience the tailor-made new pension service technology, which not only makes the elderly feel more caring, but also allows the children of the city busy work outside the fight for their careers to stop worrying about their parents, and promote the social harmony of the family. Family and Social Harmony.

Limitations

This study has several limitations. First, the research adopts a qualitative case study approach based on a single elderly care institution, which may limit the generalizability of the findings to other settings or regions. Second, although in-depth interviews and observations provide rich insights into older adults' experiences with digital healthcare, the sample size remains relatively small and does not capture the full diversity of elderly populations. Third, the study primarily relies on self-reported data, which may be influenced by recall bias or subjective perceptions. Finally, this study focuses on the implementation and experiences of digital healthcare at a specific point in time, and future longitudinal or multi-site studies are needed to examine changes in digital healthcare engagement over time.

Conclusion

This study suggests that bridging the digital divide in geriatric healthcare requires coordinated efforts from policy makers, institutions, and communities. Digital healthcare platforms should provide simplified interfaces for elderly users, medical institutions should establish digital support services and regular training for older adults, and governments should increase financial subsidies to ensure equitable access to digital medical devices and services. There are still many insurmountable barriers on the way forward to facilitate the formation of the "Internet + geriatrics" system, just as the 14th Five-Year Plan points out how to solve the "digital divide" problem in the long term, and to realize a comprehensive solution to the difficulties of the elderly in the use of intelligent technology; although the current Although the current main task is to constantly seek innovation and development for digital geriatrics, the country has not yet formed a notarized and credible digital medical industry standard system, and there is a lack of detailed description standards

on how to ensure the quality of digital medical products, service quality, safety and security of application for the elderly, risk prevention, etc., which also restricts the widespread implementation of digital medical care to a certain extent.³⁷

In order to effectively cope with the aging of the population, to meet the growing demand of the elderly for healthy and high-quality old age, focusing on the digital reform and innovation of geriatric medical care is a major initiative in the field of medical services, but also to cope with the inevitable trend of the aging society. For example, 5G enables real-time remote consultations and emergency responses for chronic disease patients; telemedicine platforms allow continuous follow-up and medication management; and VR-based rehabilitation programs support cognitive training and physical therapy for older adults with dementia and mobility impairments.³⁸ Elderly people, as the main body of the medical industry, should be given multi-level, multi-choice medical skills, standing in the perspective of the elderly for them to strive for the best medical service experience. The digital medical field should adhere to the development principle of “taking the elderly as the core”, gather professional and compound talents, and focus on the emerging reform of “Internet + medical” for the aging, and accurately position the smart elderly medical online platform to accelerate the digital medical industry. High-tech development. The government and enterprises can carry out commercial exchanges, promote scientific and sustainable cooperation, and on the premise of maximizing the welfare of the elderly, provide certain social security system support and financial support for the commercial system for digital medical care, deepen the function of big data prediction and analysis, and shape a number of high-quality professional digital geriatric medical teams as early as possible. Future research should incorporate multi-site longitudinal investigations and quantitative measurements to further validate and expand the findings.

Data Sharing Statement

All data generated or analyzed during this study are included in this manuscript.

Ethics Approval

This study complied with the Declaration of Helsinki.

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Disclosure

The authors declare that they have no conflict of interest.

References

1. Chen Q-F, Ni C, Jiang Y, et al. Global burden of disease and its risk factors for adults aged 70 and older across 204 countries and territories: a comprehensive analysis of the global burden of disease study 2021. *BMC Geriatr*. 2025;25(1):462. doi:10.1186/s12877-025-06095-1
2. Kim S, Park C, Park S, et al. Measuring digital health literacy in older adults: development and validation study. *J Med Internet Res*. 2025;27:e65492. doi:10.2196/65492
3. Xia X, Zhu M. The impact of digital literacy on older adults' utilization of community-based home care services: a cross-sectional study. *BMC Health Serv Res*. 2025;25(1):1367. doi:10.1186/s12913-025-13427-9
4. Akimov AV, Gemueva KA, Semenova NK. The seventh population census in the PRC: results and prospects of the country's demographic development. *Her Russ Acad Sci*. 2021;91(6):724–735. doi:10.1134/S1019331621060083
5. Chen T, Hou P, Wu X, Yang J, Cong G. Changes of people's fertility attitudes based on analysis of online public opinion on three-child policy in China. *Biodemography Soc Biol*. 2023;68(4):166–195. doi:10.1080/19485565.2023.2271831

6. Aidoud A, Gana W, Poitou F, et al. High prevalence of geriatric conditions among older adults with cardiovascular disease. *J Am Heart Assoc.* **2023**;12(2):e026850. doi:10.1161/JAHA.122.026850
7. Zhao Y, Rokhani FZ, Shariff Ghazali S, Chew BH. Defining the concepts of a smart nursing home and its potential technology utilities that integrate medical services and are acceptable to stakeholders: a scoping review protocol. *BMJ Open.* **2021**;11(2):e041452. doi:10.1136/bmjopen-2020-041452
8. Bujnowska-Fedak MM, Pirogowicz I. Support for e-health services among elderly primary care patients. *Telemed JE Health.* **2014**;20(8):696–704. doi:10.1089/tmj.2013.0318
9. Graëff C, Lampert T, Mazellier J-P, Padoy N, El Amiri L, Liverneaux P. The preliminary stage in developing an artificial intelligence algorithm: a study of the inter- and intra-individual variability of phase annotations in internal fixation of distal radius fracture videos. *Artificial Intelligence Surg.* **2023**;3(3):147–159. doi:10.20517/ais.2023.12
10. Moglia A, Georgiou K, Marinov B, et al. 5G in healthcare: from COVID-19 to future challenges. *IEEE J Biomed Health Inform.* **2022**;26(8):4187–4196. doi:10.1109/JBHI.2022.3181205
11. Chan S, Li L, Torous J, Gratzner D, Yellowlees PM. Review and implementation of self-help and automated tools in mental health care. *Psychiatr Clin North Am.* **2019**;42(4):597–609. doi:10.1016/j.psc.2019.07.001
12. Cohen IG, Evgeniou T, Gerke S, Minssen T. The European artificial intelligence strategy: implications and challenges for digital health. *Lancet Digit Health.* **2020**;2(7):e376–e79. doi:10.1016/S2589-7500(20)30112-6
13. Havelikar U, Patil D, Salve S, Heidarizade N, Patel VP, Chaudhari N. Comparative overview of telemedicine use in Asian countries: trends, challenges, and future directions. *Intelligent Hospital.* **2025**;100031. doi:10.1016/j.inhs.2025.100031
14. Alshehri M, Alamri A, Alghamdi M, Nazer R, Kujan O. Smart-card technology for the dental management of medically complex patients. *Healthcare.* **2022**;10(11). doi:10.3390/healthcare10112314
15. Rahman MM, Khatun F, Sami SI, Uzzaman A. The evolving roles and impacts of 5G enabled technologies in healthcare: the world epidemic COVID-19 issues. *Array.* **2022**;14:100178. doi:10.1016/j.array.2022.100178
16. Wan S, Chen Y, Xiao Y, Zhao Q, Li M, Wu S. Spatial analysis and evaluation of medical resource allocation in China based on geographic big data. *BMC Health Serv Res.* **2021**;21(1):1084. doi:10.1186/s12913-021-07119-3
17. Lu X, Yao Y, Jin Y. Digital exclusion and functional dependence in older people: findings from five longitudinal cohort studies. *EClinicalMedicine.* **2022**;54:101708. doi:10.1016/j.eclinm.2022.101708
18. Badr J, Motulsky A, Denis J-L. Digital health technologies and inequalities: a scoping review of potential impacts and policy recommendations. *Health Policy.* **2024**;146:105122. doi:10.1016/j.healthpol.2024.105122
19. Giakas AM, Narayanan R, Ezeonu T, et al. Assessing the accuracy and utility of ChatGPT responses to patient questions regarding posterior lumbar decompression. *Artificial Intelligence Surg.* **2024**;4(3):233–246. doi:10.20517/ais.2024.24
20. Sharma S, Kumari B, Ali A, et al. Mobile technology: a tool for healthcare and a boon in pandemic. *J Family Med Prim Care.* **2022**;11(1):37–43. doi:10.4103/jfmpc.jfmpc_1114_21
21. Tu S, Yan X, Jie K, Ying M, Huang C. WeChat: an applicable and flexible social app software for mobile teaching. *Biochem Mol Biol Educ.* **2018**;46(5):555–560. doi:10.1002/bmb.21170
22. Zhou Z, Wang L, Ye R, Yue H. A humanistic-care factors application hierarchical design-model for intelligent elderly products. *Heliyon.* **2023**;9(3):e13734. doi:10.1016/j.heliyon.2023.e13734
23. Gu D, Yang X, Li X, Jain HK, Liang C. Understanding the role of mobile internet-based health services on patient satisfaction and word-of-mouth. *Int J Environ Res Public Health.* **2018**;15(9):1972. doi:10.3390/ijerph15091972
24. Faust O, Lei N, Chew E, Ciacchio EJ, Acharya UR. A smart service platform for cost efficient cardiac health monitoring. *Int J Environ Res Public Health.* **2020**;17(17):6313. doi:10.3390/ijerph17176313
25. Gan S, Zhuang Q, Gong B. Human-computer interaction based interface design of intelligent health detection using PCANet and multi-sensor information fusion. *Comput Methods Programs Biomed.* **2022**;216:106637. doi:10.1016/j.cmpb.2022.106637
26. Han Y, Lie RK, Guo R. The internet hospital as a telehealth model in China: systematic search and content analysis. *J Med Internet Res.* **2020**;22(7):e17995. doi:10.2196/17995
27. Cao B, Huang W, Chao N, Yang G, Luo N. Patient activeness during online medical consultation in China: multilevel analysis. *J Med Internet Res.* **2022**;24(5):e35557. doi:10.2196/35557
28. Chen F, Jiang Q, Lu Z, Cao S. General practitioners' perspectives of the integrated health care system: a cross-sectional study in Wuhan, China. *Fam Pract.* **2021**;38(2):103–108. doi:10.1093/fampra/cmaa088
29. Sutherland J, Belec J, Sheikh A, et al. Applying modern virtual and augmented reality technologies to medical images and models. *J Digit Imag.* **2019**;32(1):38–53. doi:10.1007/s10278-018-0122-7
30. Verhey JT, Haglin JM, Verhey EM, Hartigan DE. Virtual, augmented, and mixed reality applications in orthopedic surgery. *Int J Med Robot.* **2020**;16(2):e2067. doi:10.1002/rcs.2067
31. Zheng G, Fang Q, Chen B, Yi H, Lin Q, Chen L. Qualitative evaluation of baduanjin (traditional Chinese Qigong) on health promotion among an elderly community population at risk for ischemic stroke. *Evid Based Complement Alternat Med.* **2015**;2015:893215. doi:10.1155/2015/893215
32. Sadagopan NS, Prasad D, Jain R, Ahuja C, Dahdaleh NS, El Tecle NE. Beyond AI and robotics: the Dawn of surgical automation in spine surgery. *Artificial Intelligence Surg.* **2024**;4(4):387–400. doi:10.20517/ais.2024.34
33. Harvath T, Mongoven J, Sexson K, Bettiga K. Development of competencies to strengthen support for caregivers and enhance their capacity to provide care. *Gerontol Geriatr Educ.* **2023**;44(4):523–527. doi:10.1080/02701960.2022.2083117
34. Sahlab N, Jazdi N. AI-based elderly assistance systems. *Stud Health Technol Inform.* **2020**;273:163–169. doi:10.3233/SHTI200633
35. Xu L, Zhang Y. Grading nursing care study in integrated medical and nursing care institution based on two-stage gray synthetic clustering model under social network context. *Int J Environ Res Public Health.* **2022**;19(17). doi:10.3390/ijerph191710863
36. Tanna N, Gibstein AR, Boll A, et al. Joint-venture ambulatory surgery centers: the perfect partnership. *Plast Reconstr Surg.* **2021**;148(5):1149–1156. doi:10.1097/PRS.00000000000008423
37. Konstantinidis EI, Bamparopoulos G, Billis A, Bamidis PD. *Internet of Things for an Age-Friendly Healthcare.* IOS Press; **2015**. doi:10.3233/978-1-61499-512-8-587
38. Zijie A, Yawei Z, Qiaoyu Z, et al. Advances in the application of artificial intelligence in continuing education for trauma orthopedics. *Artificial Intelligence Surg.* **2025**;5(4):505–520. doi:10.20517/ais.2025.34

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